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The educational preparation of student teachers: does it make a difference?

P.H. Flens, M. Helms-Lorenz, R. Maulana, W.J.C.M. van de Grift

Abstract

High quality of education is, in large part, the consequence of effective teachers. Teacher effectiveness is an important topic in the field of educational research. Several studies have indicated a large range of activities teachers can undertake to improve their students' outcomes. Since education is a good start to learn about the job, a number of scholars state that teacher education programs have a major influence on teacher quality. Not only the skills of a beginning teacher, also his/ her professional development later in their career is influenced by the pre-service teacher education program. However, little is known about the contribution pre-service teacher education programs make to teacher effectiveness. The aim of this study is to provide insights into specific features of pre-service teacher education programs that significantly contribute to effective teaching once the students start their career as a teacher. Findings are reported from a study among 304 beginning teachers at secondary schools who completed their pre-service teacher education programs at 6 different universities in The Netherlands. A Monte Carlo based permutation test was performed to estimate the effects of differences between pre-service teacher education programs on several indicators of effective teaching. Differences between teacher education programs are discussed. Directions for further research as well as suggestions for policy makers are provided.

Key words: education programs, curriculum, pre-service teachers, The Netherlands, policy, Monte Carlo permutation test.

Introduction

Student scores in the Netherlands are above average. However, compared to previous years, they are declining and other countries seem to overtake our position in international rankings (Ministry of Education, Culture and Science, 2011). To improve student scores, the competence of teachers and the quality of teacher education is getting more attention, as is the case in many countries (Creemers, 1994; Darling-Hammond and Lieberman, 2012; Darling-Hammond, & Youngs, 2002; Hattie, 2009). Research recognizes that high quality of education is, in large part, the consequence of effective teachers. The way teachers teach their students and the skills with which they teach has become a major theme in educational research (Editorial Projects in Education Research Center, 2011; Gauthier, & Dembélé, 2004). Therefore, a large amount of research in the field of education focuses on effective teaching behaviour, which is defined as teachers' behaviour affecting pupils' achievement directly (Creemers, 1994; Hattie, 2009), or indirectly, through pupils' engagement (Hattie, 2009; Van de Grift, Helms-Lorenz, & Maulana, 2014; Willingham, Pollack, & Lewis, 2002). Mainly, the goal of this kind of research is to find a way to enhance effective teaching behaviour. In this study however, we try to investigate the origin of effective teaching behaviour: the pre-service teacher education. We will examine whether education is indeed the source of teaching behaviour, and if so: which aspects of educational programs matter most.

The main research questions are therefore:

- RQ 1 Does the educational preparation of teachers play a role in effective teaching behaviour?
- RQ 2 Which features of pre-service teaching programs are most likely to prepare effective teachers?

Effective teaching behaviour

Teacher effectiveness is a wide studied area in the field of educational research. Several researchers have found examples of effective teaching behaviour that proved to be important for pupils' learning and outcomes. Sanders and Rivers (1996) found that students with comparable initial abilities and level of knowledge, showed different outcomes depending on the teacher they were assigned to. Muijs et al. (2014) pointed out key activities a teacher can undertake to teach more effectively. Examples are: managing the classroom effectively, structured lessons, asking the right questions, teaching self-regulating strategies that could help students with their work and implementing different activities for the students (Dignath & Büttner, 2008; Hattie, 2009). Based on research on effective teaching behaviour, Van de Grift (2007; 2013) suggested six domains of effective teaching skills that affect student

outcomes in a positive way. These teaching domains are classified as follows: Safe and Stimulating Learning Climate (establishing good norms and values in the classroom so that people feel safe), Efficient Classroom Management (using time efficiently), Clarity of Instruction (giving clear instructions), Activating Learning (making sure the learners are actively participating during the lesson), Adaptive Teaching (i.e., differentiation), and Teaching Learning Strategies (show learners how to handle the learning material). These domains were created through the combined literature on teacher effectiveness (e.g., Creemers, 1994; Sammons et al., 1995; Scheerens, 1992).

Teacher education

The quality of teachers, such as certification status and degree in the field to be taught, show high correlations with student outcomes (Cochran-Smith & Zeichner, 2005a; Darling-Hammond, 2000c). Generally speaking, teachers with a certification show better pupils' outcomes than teachers without having received any form of preparation into the teaching profession. In short, any preparation is better than no preparation (Darling-Hammond, 2000a). Different studies (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Brouwer & Korthagen, 2005; Hammerness, Darling-Hammond, & Bransford (2005) show that the competence of teachers is influenced by the pre-service teacher education programs from which they had graduated and Kennedy (1998) showed relationships between teacher education and the changing attitudes and beliefs of beginning teachers. Although The Netherlands knows a variety of routes to become a teacher, only the one-year teacher education programs at universities were included in this study.

Characteristics of educating teachers

How to prepare student-teachers to become effective teachers is subject to several debates worldwide. Some argue that less restrictions to be able to enter teacher education can attract the best candidates, which should automatically result in teaching quality (Paige, 2002). Others say that the quality of teacher preparation should form the focal point to ensure good quality teaching (VSNU, 2013). However, several scholars agree that there is hardly any research performed on when and how teachers should be prepared (Boyd, Grossman, Lankford, Loeb, & Wyck, 2009; Cochran-Smith & Zeichner, 2005b; Darling-Hammond, 2000b; Levine, 2006; Van Veen, Zwart, Meirink, & Verloop, 2010; Wilson, Floden, & Ferrini-Mundy, 2001; Zeichner, 2006). Thus far, many studies that tried to compare different education programs did so in terms of the structure of the program, in which simplistic comparisons were performed. This is acknowledged by Kennedy (1998), who observed that reformers of teacher education programs mainly focus on the structure of the program instead of the content. Examples are length (4-year program versus a 5-year program), prior

education (undergraduate level, graduate level) and the type of institution (university versus college). Zeichner and Conklin (2005) showed that these comparisons based on general labels are unable to explain specific teacher and pupil outcomes and they conclude that there is a need for more specific aspects of teacher education programs.

Aspects of teacher education programs¹

The focus of this study is the specific content of teacher education programs in universities in The Netherlands. Following are potential aspects of an education program that, according to different studies, should have an influence on teacher competence.

Link between theory and practice

Boyd and his colleagues (2009) tried to establish links between pupils' achievement and several aspects of 31 childhood teacher education programs (to prepare elementary teachers) in New York City. They found that aspects which focuses more on what the first-year teachers will be doing in the classroom (i.e., link between theory and practice) show significant contributions to first-year teachers' effectiveness. Brouwer and Korthagen (2005) have examined the influence of practice-theory linkages in several pre-service teacher education programs. They showed that factors like the amount of time spent in college, the alternation between college-based periods and student-teaching periods had a strong relationship with teacher competence. They concluded that the impact of pre-service teacher education depends on the arrangement of the learning environment the program provides for their student-teachers. Situational knowledge, knowing which situation calls for what type of teaching, is also important for student-teachers (Kennedy, 1998; NCRTE, 1991). A way of enhancing situational knowledge is through microteaching (Grossman, Hammerness, & McDonald, 2009), reflection on one's own teaching practice, or roleplaying.

Reflecting and critical thinking

Hammerness, Darling- Hammond and Bransford (2005) state it should be normal for a teacher to reinvestigate one's own teaching practice. A few examples of how a teacher could rethink his/ her practice are: having discussions with colleagues/ peer-students about teaching, rethinking one's own statements about education and teaching, and making a portfolio of teaching activities with corresponding evaluations. According to Darling-

¹ The reader may have noticed that subject specific matter knowledge is not included in this study. In The Netherlands, teachers who are educated in university already completed their knowledge about the subject. This knowledge is therefore not part of the education program. In addition, research shows that subject matter knowledge is more important for second-year teachers because of them being more comfortable with the basic practices of teaching (Boyd, et al., 2009). Therefore, it was decided to leave knowledge about the subject out of this study.

Hammond (2012), working with case studies or portfolios that connect learning to actual problems of teaching practice provide student-teachers with important teaching abilities and allow them to see their professional growth as a teacher. Boyd et. al (2009) showed positive effects of the implementation of a portfolio in a teacher education program. In addition, studies (Kennedy, 1998; NCRT, 1991) showed that the education of teachers had a great influence on their mind-set, which in turn influenced their teaching activities. Teachers with a bachelor's degree tend to react more positively to new methods and theories about teaching than teachers with a master's degree. However, when it came to real teaching situations, teachers with a bachelor's degree seemed more easily prone to fall back on previous experiences and traditional ways of teaching than teachers with a master's degree. Reflecting on these preferred ways of teaching could help think more consciously about the profession, prioritize one's actions and establish a sense of teacher identity.

Knowledge about child development and -psychology

Studies (Darling-Hammond, 2000b; 2012; Dicke, Parker, Holzberger, Kunina-Habenicht, Kunter, & Leutner, 2015) show that teachers who received coursework about child development and theories about learning and motivation were more likely to stay in teaching than teachers who did not receive this type of information. Goodlad (1990) and Howey and Zimpher (1989) state that academic rigor is important for providing student-teachers the tools to be able to cope with different teaching situations and different types of pupils. Grossman, Hammerness and McDonald (2009) exemplify the need for knowledge about how pupils learn, in order to create good teaching material and to anticipate on wrong answers given by pupils. Finally, Van Veen, Van Driel and Veldman (2011) found in their study that not the graduate level, but the amount of social skills can explain differences between teachers.

Field experiences

The school in which student-teachers complete their practicum also forms a great part of the education program to become a teacher. Darling-Hammond (2000b) state that, for a good field experience, it is important that there should be coherence between the theory that is provided at the institution and the practice assignments at practicum schools. Other studies (Howey & Zimpher, 1989; Kennedy, 1998; NCRT, 1991) also emphasize the importance of coherence, by stating that there should be a clear rationality between the different courses and the theory that is provided in the education program, and the tasks that the student-teacher should perform, both in the university as well as in the practice school. In order to enhance this coherence, Howey and Zimpher (1989) claim that teacher education programs should organize student-teachers in fixed groups, so that they can form a shared identity and talk about each other's experiences.

Some programs ensure a strong university and school partnership, wherein the theory about teaching can be practiced immediately at the practice school, and where the vision in the practice school reflects that of the university program. Several studies show positive effects of a strong partnership between university and the practice school (Brouwer & Korthagen, 2005). In addition, increasing complexity of teaching experiences in the practice school can help student-teachers experience success while at the same time feel their boundaries of their competence at that point in time (Brouwer & Korthagen, 2005). In Table 1, the aspects stated above are clarified in terms of more specific elements.

Table 1

Aspects of teacher education programs clarified in specific elements

Aspect	Elements
Link between theory and practice	<ol style="list-style-type: none"> 1 Workshops are provided within the university, to allow students to practice the theory that was provided in lectures. 2 Some form of teaching practice is organized within the university, wherein students can try out different ways of teaching, before they will be teaching at a practice school. Examples of these are microteaching, or role play. 3 During assessment of the products of students (e.g., portfolio, lesson plans), the use of theory provided by the university is taken into account.
Reflecting and critical thinking	<ol style="list-style-type: none"> 1 During the entire education program, students make and keep track of their personal portfolio 2 Students are obliged to have a professional plan of action/development. 3 Within the university, students form a group wherein they reflect on each other's development as a teacher. Also, there is room for discussion about topics such as educational reforms, learning concepts, or teaching methods. 4 Within the practice school, student form a group wherein they reflect on each other's field experiences. Practical situations or case studies could also be included.
Knowledge about child development and - psychology	<ol style="list-style-type: none"> 1 The university provides information about learning theories and psychological processes to the students. 2 The university provides information about processes in child development to the students.

	3 Students learn how to implement the knowledge about learning into their lesson plans.
Field experience	<p>1 Students are immediately enrolled into a practice school when they enter teacher education (to prevent reality shock).</p> <p>2 Students complete their field experience at different practice schools.</p> <p>3 The university provides assignments to the students to be carried out at the practice school.</p> <p>4 Over time, the field experience is gradually getting more complex, in terms of assignments and responsibility for classes.</p>

Hypotheses

There are some gaps in our knowledge about the influence of aspects of a teacher education program on teaching behaviour. Studies that have been carried out so far, did so in terms of general, broader aspects and with too little data to be able to compare the contribution of each aspect (Boyd et. al, 2009) or did compare data, but within only one institution (Brouwer & Korthagen, 2005). Because of these gaps, the hypotheses below are to large extent speculations.

According to previous research, the link between theory and practice is very important to learn the teacher profession. With a strong link between theory and practice, one is able to practice repeatedly with different methods of teaching. Through this integration, the student-teacher learns which form of teaching method works best in which situation. It is therefore expected that:

H1: A teachers' level of Adaptive Teaching will be related to the level of integrating theory with practice of his/ her teacher education program.

Although university students already show to be critical thinkers, reflecting on one's own teaching practice establishes new ways of critical thinking. The teacher learns to appreciate this way of thinking and will try these new thinking methods in class as well. When dealing with difficult learning material, the teacher can help the learner by asking those same reflecting questions, and stimulate learning strategies. It is therefore expected that:

H2: A teachers' level of Teaching Learning Strategies will be related to the level of reflection and critical thinking that he/ she performed in his/ her teacher education program.

With a fair amount of knowledge on child development and the psychology of young people, one is able to connect that information to the structure of his/ her lesson. He/ She can make informed decisions about the opening of the class, the pace of work and the order of different aspects of the lesson. It is therefore expected that:

H3: A teachers' level of Classroom Management will be related to the level of knowledge about child development and psychology of his/ her teacher education program.

When teachers are provided a lot of opportunities to experience teaching in practice, they learn first hand how to handle young people and deal with difficult situations. It seems logical that teachers with more field experience are better able to establish a safe and stimulating climate in class. It is therefore expected that:

H4: A teachers' level of Safe and Stimulating Climate will be related to the level of field experience he/ she obtained in his/ her teacher education program.

Method

Participants

This research is part of a national research project 'Guidance of Beginning Teachers', funded by The Netherlands Organization for Science Research. The aim of this project is to determine how teachers should be mentored in their first years of their career. All secondary schools in The Netherlands were first asked if the school provided a mentor program for new teachers, and if so, whether the school would like to participate in the project. Beginning teachers at these secondary schools were then observed during one of their lessons. In a subsequent questionnaire, they indicated the institution they graduated from as a teacher. In total, 304 teachers with a maximum of one year teaching experience were included in this study. The average age of the teachers was 29.8 years (range 20 – 59 years). The teachers were graduated in the school year 2013-2014 or 2014-2015, at 6 universities in The Netherlands. The lesson observations took place in the first half of the school year (September – December) in 2014 or 2015. The average class size was 23.5 pupils (range 7 – 32 pupils).

Aspects of teacher education programs

The aim of this study is to examine relationships between effective teaching and the aspects specified in Table 1. Therefore, to measure the degree to which every education program implemented the different aspects specified, the syllabus of the teacher education programs was studied. In the syllabi, the presence of every element in Table 1 was checked and administered. For the sake of anonymity, details of the different institutions and their teacher

education program are not provided. Instead, the presence of the elements were coded and summed, to result in a rating for every aspect (good – medium – weak). To enhance internal validity, this coding system was checked with fellow researchers.

Effective teaching behaviour

The six domains specified by Van de Grift (2007; 2013) that represent effective teaching behavior, are transformed into an observational instrument; the International Comparative Analysis of Learning and Teaching (*ICALT*; Van de Grift, 2007). With this instrument, one is able to estimate pedagogical and didactic skills of a teacher during a lesson. The ICALT behaviours have shown to positively influence pupils' academic engagement (Van de Grift, Helms-Lorenz, & Maulana, 2014). Observers specifically trained for using the ICALT scored the items on a four-point scale, ranging from 1 (generally weak) to 4 (generally strong) and mean scores for each domain were calculated.

Results

For the ICALT domain scores, descriptive results are reported in Table 2. In Table 3, results are reported for the amount of representation of the aspects per education program. For the evaluation of every program on the different aspects of teacher education, the results are reported in Table 3. In addition, the sample size per program is also reported in Table 3.

Table 2

Mean scores, standard deviations and the range for teachers' scores on the domains of effective teaching

	M	SD	Range
Safe and Stimulating Learning Climate	3.32	.52	1.50 – 4.00
Efficient Classroom Management	3.15	.59	1.00 – 4.00
Clarity of Instruction	3.02	.54	1.43 – 4.00
Activating Learning	2.57	.60	1.00 – 4.00
Adaptive Teaching	1.81	.64	1.00 – 3.75
Teaching Learning Strategies	1.99	.71	1.00 – 3.83

Table 3

Sample size and ratings on educational aspects of the teacher education programs

Program	N	Specific aspects			
		Link theory-practice	Reflection and critical thinking	Knowledge about child development - psychology	Field experience
A	46	Medium	Good	Weak	Weak
B	52	Medium	Medium	Good	Good
C	86	Weak	Weak	Medium	Weak
D	64	Good	Medium	Medium	Medium
E	29	Weak	Weak	Weak	Medium
F	27	Good	Good	Medium	Medium

Monte Carlo method

To analyze whether aspects of teacher education programs show relationships with domains of effective teaching behavior, a random permutation test was used. This type of test was chosen because permutation tests can account for the non-normal distributions the data showed and for the fact that sample sizes per institution were widely varied. This resampling method belongs to a wider group of statistic methods also known as the Monte Carlo method (Good, 2013; Todman & Duggard, 2001). The analyses were carried out by means of a Poptools add-in in Excel (Hood, 2010).

To test whether teaching behavior is related to the different aspects of the teacher education program, the education programs that were rated 'Good' in Table 3 were compared to the education programs that were rated 'Weak'. The results are shown in Table 4. The mean difference of scores on the ICALT domain between programs that were rated 'Good' and programs that were rated 'Weak' is also provided

Hypotheses

For the first hypothesis, the Adaptive Teaching- scores of teachers from program D and F were compared to the scores of teachers from program C and E. Results showed there was a significant difference between these two clusters of teachers ($p=.011$). For the second hypothesis, the Teaching Learning Strategies scores of teachers were compared in program A and F with C and E. Results showed a significant difference between these two groups of teachers ($p<.001$). The third hypothesis was tested by comparing teachers from program B with A and E and confirmed a significant difference as well ($p=.003$) and the last hypothesis

was tested and confirmed by comparing groups of teachers between program B with program A and C ($p=.018$).

Table 4

Results of Monte Carlo analyses on the effects of aspects of education programs on teaching behaviour

Aspect	Domain	Good versus weak programs (<i>mean difference in scores on the ICALT domain</i>)	Significance (one-tailed)
Link between theory and practice	Adaptive Teaching	.22	.011
Reflecting and critical thinking	Teaching Learning Strategies	.25	<.001
Knowledge about child development and - psychology	Classroom Management	.31	.003
Field experience	Safe and Stimulating Climate	.19	.018

Conclusion

The results above indicate positive relationships between aspects in a teacher education program and the teaching behaviour of its graduates. All the hypotheses stated above were confirmed. The results in Table 4 indicate that teachers who graduated from education programs that have a strong link between theory and practice; that lets students reflect on themselves as a professional; that provides information about the development of pupils and; provides chances to practice the theory in the real world, show higher levels of effective teaching. Whether the educational program *causes* this effective teaching behaviour is, however, not clear. One possible explanation of the relationships found in this study could be an area-dependent one. Since every education program (A through F) has its home somewhere in The Netherlands, pupils in that same area can be different from pupils in other areas in the country. To give an example, program A could be in an area where people have a high socioeconomic status and have above-average intelligence. Chances are high that the children of these people are also very intelligent. As a result, the teachers in this area are not actually needed for simple instructions; the pupils want to learn more about learning strategies and other forms of deep-learning. As Zeichner and Conklin (2005) stated, there is

no such thing as a perfect teacher preparation: several different ways to become a teacher could be equally effective.

Limitations

When it comes to the research questions stated above, it seems like educational preparation of student teachers do indeed play a role in effective teaching. However, this should be concluded with a degree of caution. First, this study focused solely on university education programs. In The Netherlands, there are also other routes to become a teacher. One route that supplies a large amount of the beginning teachers in The Netherlands is through college, in which subject study and teacher education are provided together in a 4-year program. Effective elements within a college-based education program could be different from education programs at universities. Second, in this study, only four aspects of the education program were taken into account. Clearly, teacher education programs consist of more aspects than these four. Other aspects, such as a focus on lifelong learning (Hammerness, Darling- Hammond, & Bransford, 2005), or changing students attitudes and beliefs about teaching (Cochran-Smith & Zeichner, 2005a), could also be important. Lastly, it is possible that these differences in effective teaching have disappeared when teachers have more experience as a teacher. Boyd and his colleagues (2009) tried to establish links between pupils' achievement and several aspects of 31 childhood teacher education programs. They found that some characteristics of the programs contributed to the achievement of the pupils. However, this contribution did not hold for second-year teachers. Possibly, teachers learn a lot during their first year of teaching, that makes up for knowledge and practice that was not provided in the education. In contrast, Wubbels and Korthagen (1990) compared different teacher education programs and found that differences between graduates could only be measured *after* the graduates had been in the teaching profession for more than two years.

Implications

This study underlines the importance of teacher education to ensure the quality of education as a whole. Even though teacher shortages are present, and more shortages are on the way in the Netherlands, we must keep track of education programs and the characteristics that are most important to ensure that good quality teachers teach our children of the future. This study tried to give a few answers about how such a program should look like. In the future, more aspects should be looked into, to establish a final list of aspects that make a good teacher education program. Also, more research about long-term development of beginning teachers is needed, to learn more about the contribution of the educational program throughout a teachers' career.

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